AFW # 4C

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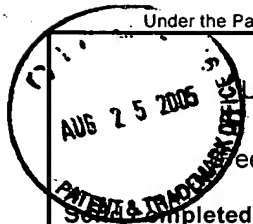

PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)
TRANSMITTAL
(Fees are subject to annual revision)

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Application Number	**10/784,260**
Filing Date	**February 24, 2004**
First Named Inventor	**Akira FUJIBAYASHI**
Art Unit	
Examiner Name	
Attorney Docket Number	**274.43168X00**

Enclosed is a petition filed under 37 CFR §1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of $ 130.00 is enclosed.

This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees)

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. 50-1417:
☐ petition fee under 37 CFR 1.17(f), (g) or (h) ☒ any deficiency of fees and credit of any overpayments
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Petition Fees under 37 CFR 1.17(f): **Fee $400** **Fee Code 1462**
For petitions filed under:
§ 1.53(e) - to accord a filing date.
§ 1.57(a) - to according a filing date.
§ 1.182 – for decision on a question not specifically provided for.
§ 1.183 – to suspend the rules.
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
§ 1.741(b) – to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g): **Fee $200** **Fee code 1463**
For petitions filed under:
§1.12 - for access to an assignment record.
§1.14 - for access to an application.
§1.47 - for filing by other than all the inventors or a person not the inventor.
§1.59 - for expungement of information.
§1.103(a) - to suspend action in an application.
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
§1.295 - for review of refusal to publish a statutory invention registration.
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
§1.377 – for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
§1.550(c) – for patent owner requests for extension of time in ex parte reexamination proceedings.
§1.956 – for patent owner requests for extension of time in inter partes reexamination proceedings.
§ 5.12 – for expedited handling of a foreign filing license.
§ 5.15 – for changing the scope of a license.
§ 5.25 – for retroactive license.

Petition Fees under 37 CFR 1.17(h): **Fee $130** **Fee Code 1464**
For petitions filed under:
§1.19(g) – to request documents in a form other than that provided in this part.
§1.84 – for accepting color drawings or photographs.
§1.91 – for entry of a model or exhibit.
§1.102(d) – to make an application special.
§1.138(c) – to expressly abandon an application to avoid publication.
§1.313 – to withdraw an application from issue.
§1.314 – to defer issuance of a patent.

Name (Print/Type)	**Carl I. Brundidge**	*Registration No. (Attorney/Agent)*	**29,621**
Signature		*Date*	August 25, 2005

274.43168X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Akira FUJIBAYASHI

Serial No.: 10/784,260

Filed: February 24, 2004

For: METHOD AND APPARATUS FOR INCREASING AN AMOUNT OF MONEY ON DEMAND WHEN MONITORING REMOTE MIRRORING PERFORMANCE

PETITION TO MAKE SPECIAL
UNDER 37 CFR §1.102(MPEP §708.02)

MS Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

August 25, 2005

Sir:

Applicants hereby petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d). Pursuant to MPEP §708.02(VIII), Applicants state the following.

(A) This Petition is accompanied by the fee set forth in 37 CFR §1.17(h).

The Commissioner is hereby authorized to charge any additional payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) All claims are directed to a single invention.

If the Office determines that all claims are not directed to a single invention, Applicant will make an election without traverse as a prerequisite to the grant of special status in conformity with established telephone restriction practice.

08/26/2005 JADD01 00000045 10784260
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(C) A pre-examination search has been conducted.

The search was directed towards a storage system and method implemented in the storage system. In particular, the search was directed towards increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function, wherein the storage system includes first and second storage subsystems which are connected to each other via a path and wherein the first storage subsystem is connected to a host. According to the present invention, a primary volume is provided in the first storage subsystem and a remote secondary volume is provided in the second storage subsystem. The remote secondary volume is a copied volume of the primary volume, and the primary volume and the remote secondary volume are operated in the asynchronous mode. A memory is provided in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume. Retrieved data is temporarily stored in the memory and the data is stored in the remote secondary volume. An unused area of the queuing area is monitored and an amount of the memory therein is increased, when the unused area becomes less than a predetermined amount.

The search of the above features was conducted in the following areas:

Class	Subclasses
707	201
710	56, 57, 310
711	113, 133-135, 144
714	718

Additionally, a computer database search was conducted on the USPTO systems EAST and WEST.

(D) The following is a list of the references deemed most closely related to the subject matter encompassed by the claims:

U.S. Patent Number	Inventors
5,426,736	Guineau, III
6,289,416	Fukushima et al
6,295,582	Spencer
6,385,673	DeMoney
6,401,147	Sang et al
6,442,661	Dreszer
6,457,105	Spencer et al

U.S. Patent Application Publication No.	Inventor(s)
2004/0024794	Jain et al

Foreign Document	Inventor
WO 0231660	Clack
JP 2002-149492	Tsukada et al

A copy of each of these references (as well as other references uncovered during the search) is enclosed in an accompanying IDS.

(E) It is submitted that the present invention is patentable over the references for the following reasons.

It is submitted that the cited references, whether taken individually or in combination with each other, fail to teach or suggest the invention as claimed. In

particular, the cited references, at a minimum, fail to teach or suggest as recited in the claims:

a first feature of the present invention as recited in independent claim 1, of providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes than a predetermined amount; and

a second feature of the present invention as recited in independent claim 14, of providing a queuing area having memory for temporarily storing data transferred to the second storage subsystem from the first storage subsystem wherein an unused area of the queuing is monitored and an amount of the memory therein is increased when the unused area becomes less than a predetermined amount.

Further, the cited references fail to teach or suggest the above noted features of the present invention when taken in combination with other limitations recited in the claims.

The references considered most closely related to the claimed invention are briefly discussed below:

Guineau, III (U.S. Patent No. 5,426,736) discloses an apparatus and method for dynamically tuning queue depths to provide improved storage subsystem throughput and resource utilization across a full range of I/O loads is described. The maximum allowable queue depth for a command queue is

adjusted at predetermined cycle intervals on the basis of an I/O workload measured during the cycle. In one embodiment of the invention, the interval is a fixed system parameter, but in an alternative embodiment, the interval size is automatically adjusted to keep the rate of adjustment of the maximum allowable queue depth within a preferred range. In a preferred embodiment, the size of each I/O command is stored before it is sent to the device queue. Read, write and miscellaneous I/O commands may be queued and managed separately. After a predetermined number of commands have been stored, the predominant command size during the cycle interval is determined. The predominant command size is used to select a new maximum allowable queue depth, from a set of established values preferably selected so that, at least to a first order approximation, the maximum allowable queue depth is inversely proportional to the predominant command size. Preferably, this value is selected from a set of values which have been predetermined for all possible command sizes allowed for the system. If the device queue depth were fixed as was done in the prior art, the queue management software could take no further action until a command on the device queue had been executed. Because, however, in the current invention M may vary periodically, movement of commands from the pending queue to the device queue does not have to be synchronous with execution of commands on the device queue, leading to greater efficiencies. (See, e.g., Abstract and column 12, lines 8-17).

However, unlike the present invention, Guineau III does not teach or suggest a method and system of increasing an amount of memory in a queuing

area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Guineau III does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Guineau, III at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Fukushima (U.S. Patent No. 6,289,416) discloses a disk drive device containing a cache memory having K queue entries (K is an integer) to operate in a write cache mode and a method for controlling the disk drive device. The number of the queue entries to be used in the write cache mode can be gradually decreased from the number K to a decreased number by a predetermined number, and the number of the queue entries to be used in the write cache mode can be gradually increased from the decreased number towards the number K by a predetermined number, in response to values of parameters, such as an error

rate and Non Repeatable Run Out or Repeatable Run Out of the rotating data recording disk at writing of data from the cache memory to a rotating data recording disk. Another aspect of the present invention is that a disk drive device containing a rotating data recording disk and a cache memory which includes a plurality of queue entries for storing data sent from a host processor, to operate in a write cache mode includes a detector for detecting that at least one queue entry in the cache memory stores the data, a write circuit for writing the data stored in the queue entry into a target sector of the rotating data recording disk, an error detector for detecting an occurrence of error at the writing of the data into the target sector, an error recovery circuit for performing one of error recovery steps for the data and rewriting the data into the target sector, a recovery detector for detecting that all error recovery steps are performed for the data, and that the rewriting of the data into the target sector fails, a write circuit for writing the data into an alternative sector of the rotating data recording disk, a write success detector for detecting that the writing of the data into the alternative sector succeeds, a threshold detector for detecting that Non Repeatable Run Out or Repeatable Run Out of the rotating data recording disk exceeds a predetermined level, and a processor sensor for informing the host processor of that a status of the disk drive device is switched to a status in which the disk drive device does not operate in the write cache mode. (See, e.g., Abstract and column 4, line 58-column 5, line 14).

However, unlike the present invention, Fukushima does not teach or suggest a method and system of increasing an amount of memory in a queuing

area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Fukushima does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Fukushima at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Spencer (U.S. Patent No. 6,295,582) discloses a system and method for providing improved cache memory management. Broadly, the system and method improve the performance of an asynchronous input/output (I/O) cache by ensuring that a certain predetermined amount of space is readily available, at all times, to receive new data. In this regard, a memory manager monitors the cache memory space, and evaluates how much "free" or available space exists at all times. As new data is read into the cache memory space, the amount of "free" space is reduced. Once the free spaced is reduced below a

predetermined amount, then one or more cache lines are flushed or discarded to ensure that the predetermined amount of space remains available at all times. Significantly, the system and method eliminate the latency that is associated with checking a cache to determine whether free space is available and/or freeing up space in a cache for new data. In accordance with the preferred embodiment, the predetermined amount of data may be programmably configured. Preferably, the acceptable range for this predetermined amount may vary from one cache line to four cache lines. Further, the step of reading data into the cache memory may further include the step of determining the number of data bytes to be read into the cache memory (if more than one), and immediately reading all the requested data bytes into available cache memory space. (See, e.g., Abstract and column 3, lines 8-16).

However, unlike the present invention, Spencer '582 does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Spencer '582 does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Spencer '582 at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Clack (WO 0231660) discloses a Best Fit allocator for dynamic memory management. Portions of the memory that are presently unused are call free cells, and each free cell has a size. The allocator uses a bitmap which, for each number of predetermined sizes, indicates whether free memory cells of that size exist. It also employs a second data array with an entry for each of the predetermined cell sizes. When one or more free cells of a given size exist, the corresponding entry of the data array is a pointer to one of those free cells. The free cells themselves contain pointers to other free cells of the same size, or to free cells that are slightly smaller or larger. The allocator is scalable, in that the worst-case behaviour is independent of the size of the heap, and is independent of the number of free cells and of the number of cells already in use for memory storage. It is also incremental and non-disruptive, in that each memory operation (including splitting and coalescing of free cells) is guaranteed to complete within a small bounded time. We also present a novel collector and a priority queuing mechanism that operate on principles similar to those of the allocator. Upon receipt of an instruction to insert a new cell into the priority queue, the following actions occur: The reference data of said cell is inspected to determine the value

that will be used for subsequent selection –we call this value "x", We call said cell "this cell" and its previous and next pointers are called "previous" and "next", First we determine whether the data array has sufficient layers to support the insertion, If not, we create new layers. (See, e.g., Abstract and p. 40, line 31-p. 41, line 8).

However, unlike the present invention, Clack does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Clack does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Clack at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

DeMoney (U.S. Patent No. 6,385,673) discloses a system and method for tuning a storage system that may include characterizing a maximum sustainable throughput for the storage system. The maximum sustainable throughput may be decreased by a primary derate parameter to obtain a primary throughput. Sizes for buffer units may be determined at different stream rates, where during operation the buffer units buffer a data stream between a stream requester and storage. Buffer unit sizes may be determined by generating stream simulators sufficient to consume the primary throughput and then optimizing the buffer sizes to prevent underruns. This may be repeated at different stream rates to determine a table of buffer sizes. The primary throughput may be decreased by a secondary derate parameter to obtain a maximum system bandwidth which sets an upper limit on admission of streams. When buffer sizes are determined, a prefill margin parameter may be set by which request deadlines must be met. Also, an available rate parameter may be set to proportion available bandwidth between rate-guaranteed streams and non-rate-guaranteed requests. The proportion allocated for rate-guaranteed requests may be used to determine buffer sizes that are able to meet the prefill margin. Another parameter may set the length of a seek reorder queue that orders storage requests according to their physical address. This parameter allows a tradeoff between seek efficiency and variability in service time, which may require larger buffer sizes. Also, the block size by which data is accessed in the storage system may be configured. Requests from the deadline and priority queues are migrated to the seek reorder queue whenever the seek reorder queue is not filled to its maximum size. Each

migration is done from the queue indicated by the current slot of the cycle and then the cycle advances to the next slot. If the queue indicated by the slot is empty, then an entry from the alternate queue is chosen if it is non-empty. The migrated entry is ordered in the seek reorder queue such that all requests to one side of it refer to data blocks with disk addresses greater than or equal to its and all blocks on the other side in the list have data blocks with disk address less than or equal to its. (See, e.g., Abstract and column 4, line58-column 5, line 2).

However, unlike the present invention, DeMoney does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, DeMoney does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, DeMoney at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these

features of the present invention in combination with the other limitations recited in each of the independent claims.

Tsukada (Japanese Patent Application No. 2002-149492) discloses a disk sub-system 102 interposed between a central processing unit 101 and a disk drive 103, a priority queue area 108 whose capacity is made variable and set to an upper limit value 111 and a general queue area 109 are set in a queue management table 107 of a cache control part 106 which manages the cache memory 105, and the management of the priority data whose priority is high in the cache memory 105 is operated in a priority queue area 108, and the management of the other general data is operated in the general queue area 109 so that the residence time of the priority data in the cache memory 105 can be made longer than that of the general data. Thus, it is possible to maintain the hit rate of the priority data highly regardless of the rate of the storage capacity of a disk drive 103. (See, e.g., Abstract).

However, unlike the present invention, Tsukada does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Tsukada does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused

area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Tsukada at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Sang (U.S. Patent No. 6,401,147) discloses a programmable split-queue structure includes a first queue area for receiving entries, a second queue area for outputting entries input to said first queue area, and a queue overflow engine logically coupled to the first queue area and the second queue area. The queue overflow engine functions to transfer entries from the first queue area to the second queue area using one of two transfer modes. The queue overflow engine selects the most appropriate transfer mode based on a prescribed threshold value that can be dynamically programmed. An overflow storage area having high capacity may be provided in an external memory in order to increase the overall capacity of the queue structure. According to one implementation of the present invention, the overflow mode requires that the queue overflow engine perform a first transfer of entries from the output portion of the first queue area to the overflow storage area. Next, the queue overflow engine performs a second transfer wherein the entries currently stored in the overflow storage area are transferred to the second queue area. Furthermore, the trickle mode requires

that the queue overflow engine transfer entries directly from the output portion of the of the first queue area into the input portion of the second queue area. (See, e.g., Abstract and column 3, lines 3-13).

However, unlike the present invention, Sang does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Sang does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Sang at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Dreszer (U.S. Patent No. 6,442,661) discloses a method of memory management in a computer system comprising memory. The method includes the steps of: in response to requests for allocation of memory blocks that remain

allocated for different durations, allocating each memory block from one of a plurality of regions in the memory based on the duration that the memory block is to remain allocated; and maintaining a plurality of memory segments of one or more sizes in the memory, and in response to a request for allocation of a memory block if the requested block size is less than a predetermined size, then allocating the requested block from among said segments, otherwise allocating the requested block from another portion of the memory. The number of data segments are changed in relation to memory requests. Further at least a portion of the memory is allocated to a cache having one or more buffers. The cache buffers can be allocated for non-cache use, including increase the number of said data segments, and are then deallocated back to the cache. Referring to FIG. 3B, the memory manager 30 then creates and maintains size queues 40 (SQ) including plurality of memory segments 42 of varying predetermined sizes, or separate memory pools, in a third region of the memory from the heap 34, to satisfy smaller short term efficient memory block allocation requests (e.g., requiring few/brief allocation steps). As such, smaller short term memory block allocations are segregated by the use of the size queues 40 (e.g., six queues), dedicated to predetermined sizes of memory allocation requests (e.g., memory block allocations ranging from 32 up to 1024 bytes, with odd sizes rounded up). (See, e.g., Abstract and column 4, lines 5-17).

However, unlike the present invention, Dreszer does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the

present invention as recited in the claims. Particularly, Dreszer does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Dreszer at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Spencer (U.S. Patent No. 6,457,105) discloses a system and method for providing improved memory management in an asynchronous I/O cache memory. The method includes the steps of identifying a request for data from the system memory by a requesting device that is in communication with the system memory via an I/O bus. Then the method controls the communication of data from the system memory into the cache memory. The method further includes the step of communicating the data from the cache memory to the requesting device, and immediately after communicating the data to the requesting device, the method discards the data from the cache memory. In

accordance with the preferred embodiment, the method flushes data from the I/O cache line at a time. Therefore, when a given cache line of data is flushed from the cache after the last data byte of the cache line is communicated out to the requesting device. It will be appreciated, however, that more sophisticated implementations may be employed. For example, it may be determined by a cache memory controller that the requesting device has requested a block of contiguous data, which block ends at some intermediate position within the cache line. However, consistent with the inventive concepts, upon determination that the last data byte from the block has been communicated, then the invention may immediately flush the cache line containing that last data byte. If the data block spanned more than one cache line, then previous cache lines would be flushed upon communication of the last data byte from each line to the requesting device. (See, e.g., Abstract and column 8, line 65-column 9, line 10).

However, unlike the present invention, Spencer '105 does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Spencer '105 does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output (I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory

therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Spencer '105 at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Jain (U.S. Patent Application Publication No. 2004/0024794) discloses a buffered message queue architecture for managing messages in a database management system. A "buffered message queue" refers to a message queue implemented in a volatile memory, such as a RAM. The volatile memory may be a shared volatile memory that is accessible by a plurality of processes. The buffered message queue architecture supports a publish and subscribe communication mechanism, where the message producers and message consumers may be decoupled from and independent of each other. The buffered message queue architecture provides all the functionality of a persistent publish-subscriber messaging system, without ever having to store the messages in persistent storage. The buffered message queue architecture provides better performance and scalability since no persistent operations are needed and no UNDO/REDO logs need to be maintained. Messages published to the buffered message queue are delivered to all eligible subscribers at least once, even in the event of failures, as long as the application is "repeatable." The buffered

message queue architecture also includes management mechanisms for performing buffered message queue cleanup and also for providing unlimited size buffered message queues when limited amounts of shared memory are available. The architecture also includes "zero copy" buffered message queues and provides for transaction-based enqueue of messages. Buffered message queue 106 may be allocated an initial amount of storage in shared memory 104 that may be increased or decreased over time as storage requirements change. The amount of memory allocated to buffered message queue 106 may be specified automatically by a database server process or specified manually, for example by a database administrator. Example factors that may be considered in determining the amount of shared memory 104 allocated to buffered message queue 106 include, without limitation, the size of shared memory 104, the past and present amount of shared memory 104 required by processes accessing shared memory 104 and the estimated amount of data that will be stored in buffered message queue 106 at any given time. (See, e.g., Abstract and paragraphs 40-42).

However, unlike the present invention, Jain does not teach or suggest a method and system of increasing an amount of memory in a queuing area on demand in a storage system implementing a remote mirroring function as in the present invention as recited in the claims. Particularly, Jain does not teach or suggest providing memory in a queuing area of the second storage subsystem for temporarily storing data transferred to the second storage subsystem from the first storage subsystem in response to a write input/output

(I/O) issued by the host to write data in the primary volume and monitoring an unused area of the queuing area and increasing an amount of the memory therein when the unused area becomes less than a predetermined amount as in the present invention as recited in the claims.

More particularly, Jain at a minimum does not teach or suggest the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims.

Therefore, since the cited references at a minimum fail to teach or the above described first feature of the present invention as recited in independent claim 1, and the above described second feature of the present invention as recited in independent claim 14, and further fail to teach or suggest these features of the present invention in combination with the other limitations recited in each of the independent claims, it is submitted that all of the claims are patentable over the cited references whether said references are taken individually or in combination with each other.

F. Conclusion

Applicant has conducted what it believes to be a reasonable search, but makes no representation that "better" or more relevant prior art does not exist. The United States Patent and Trademark Office is urged to conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the United States Patent and Trademark Office may locate in its own independent search. Further, while Applicant has identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is patentable over the references, the United States Patent and Trademark Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

In view of the foregoing, Applicant requests that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

G. Fee (37 C.F.R. 1.17(i))

The fee required by 37 C.F.R. § 1.17(i) is to be paid by:

[X] the Credit Card Payment Form (attached) for $130.00.

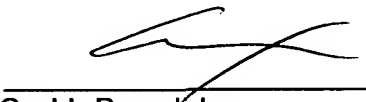
[ ] charging Account _____ the sum of $130.00.

A duplicate of this petition is attached.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (274.43168X00).

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.



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